

Post processing for SLS printed parts

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Learn about the most common SLS post processing methods from dyeing to metal plating.

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Introduction

SLS parts are printed to a high level of accuracy, have good strength and often function as end use parts. Because of the nature of the powder based fusion process, SLS printed parts have a powdery, grainy finish. Post processing of SLS parts is common practice with a range of techniques and finishes available. Coatings are also regularly added to SLS parts to improve the performance. Furthermore, a functional coating can sometimes help to compensate for the lack of feasible material grades for SLS.

This article will discuss the most common SLS post processing methods.

Standard finish

This is the default finish for SLS. Parts are removed from the build chamber and all powder is removed from the part with compressed air. The surface is then also cleaned via plastic bead blasting to remove any un-sintered powder sticking to the surface. This finish is inherently rough, similar to a medium grit sandpaper (satin-like matte finish that is slightly grainy). This is also the best surface preparation for painting or lacquering.

Pros

- + All SLS parts come with this standard finish (unless otherwise specified)
- + Good accuracy as overall geometry is not altered
- + Low cost

Cons

- Matte, grainy surface finish
- Limited colour options based on powder colour (typically white)

Finish	★ ★ ☆ ☆ ☆
Tolerances	★ ★ ★ ★ ★
Speed	★ ★ ★ ★ ★



The standard finish on an SLS 3D printed part

Media tumbled (vibro polish)

For a smoother surface texture, Nylon SLS parts can be polished in media tumblers or vibro machines. A tumbler that contains small ceramic chips that vibrate against the object gradually erode the outer surface down to a polished finish. As a result this process does have a small effect on part dimensions and results in rounding sharp edges. It is not recommended that parts with fine details and intricate features are tumbled.

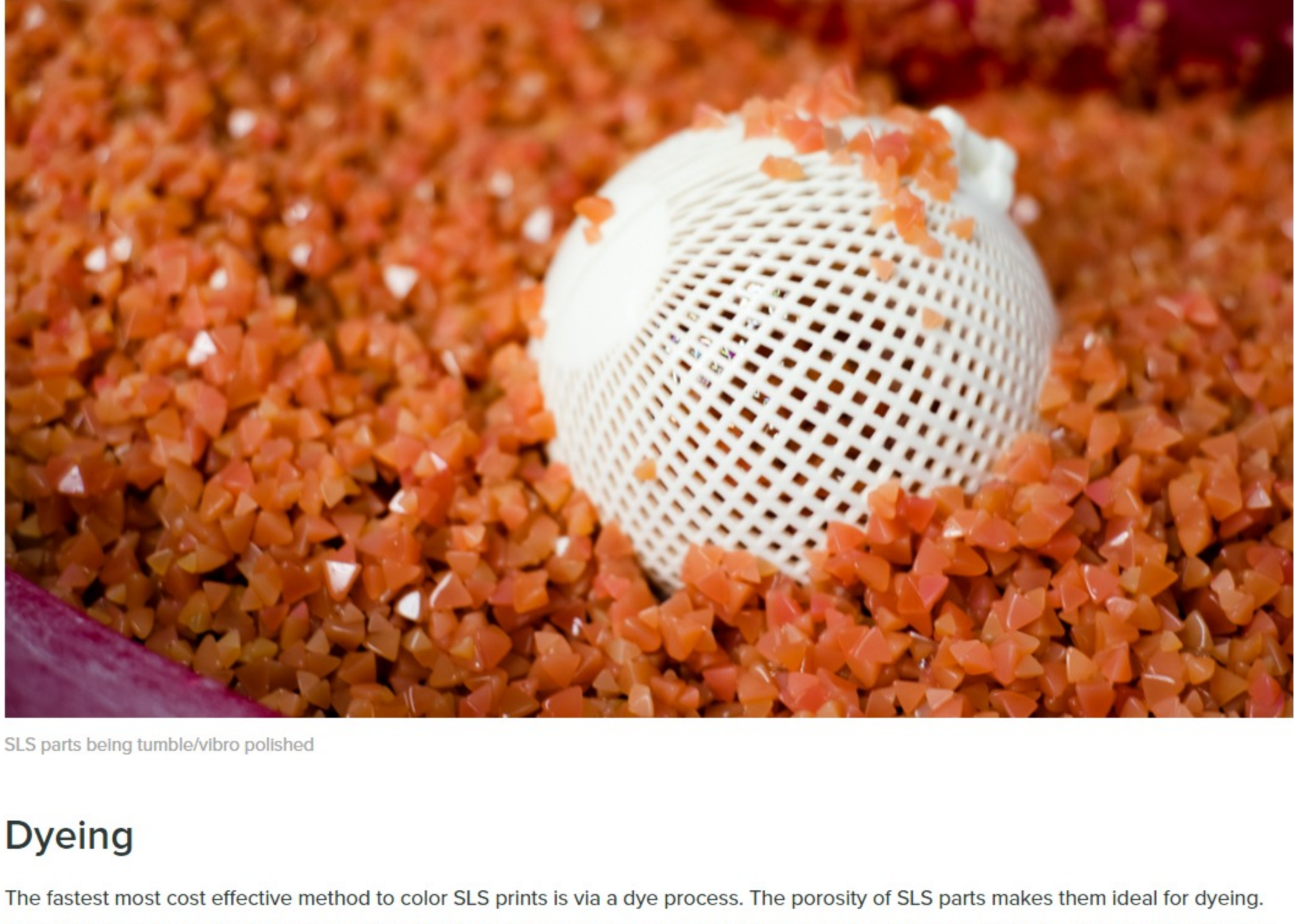
Pros

- + Excellent smooth surface
- + Multiple parts can be done at once
- + Removes sharp edges

Cons

- Not suitable for delicate features
- Removes sharp edges which can negatively affect part geometry

Finish	★ ★ ★ ★ ☆
Tolerances	★ ★ ★ ☆ ☆
Speed	★ ★ ★ ☆ ☆



SLS parts being tumble/vibro polished

Dyeing

The fastest most cost effective method to color SLS prints is via a dye process. The porosity of SLS parts makes them ideal for dyeing. The part is immersed in a hot colour bath with a large range of colors available. Using a colour bath ensures full coverage of all internal and external surface. Typically the dye only penetrates the part down to a depth of around 0.5 mm meaning continued wear to the surface will expose the original powder colour.

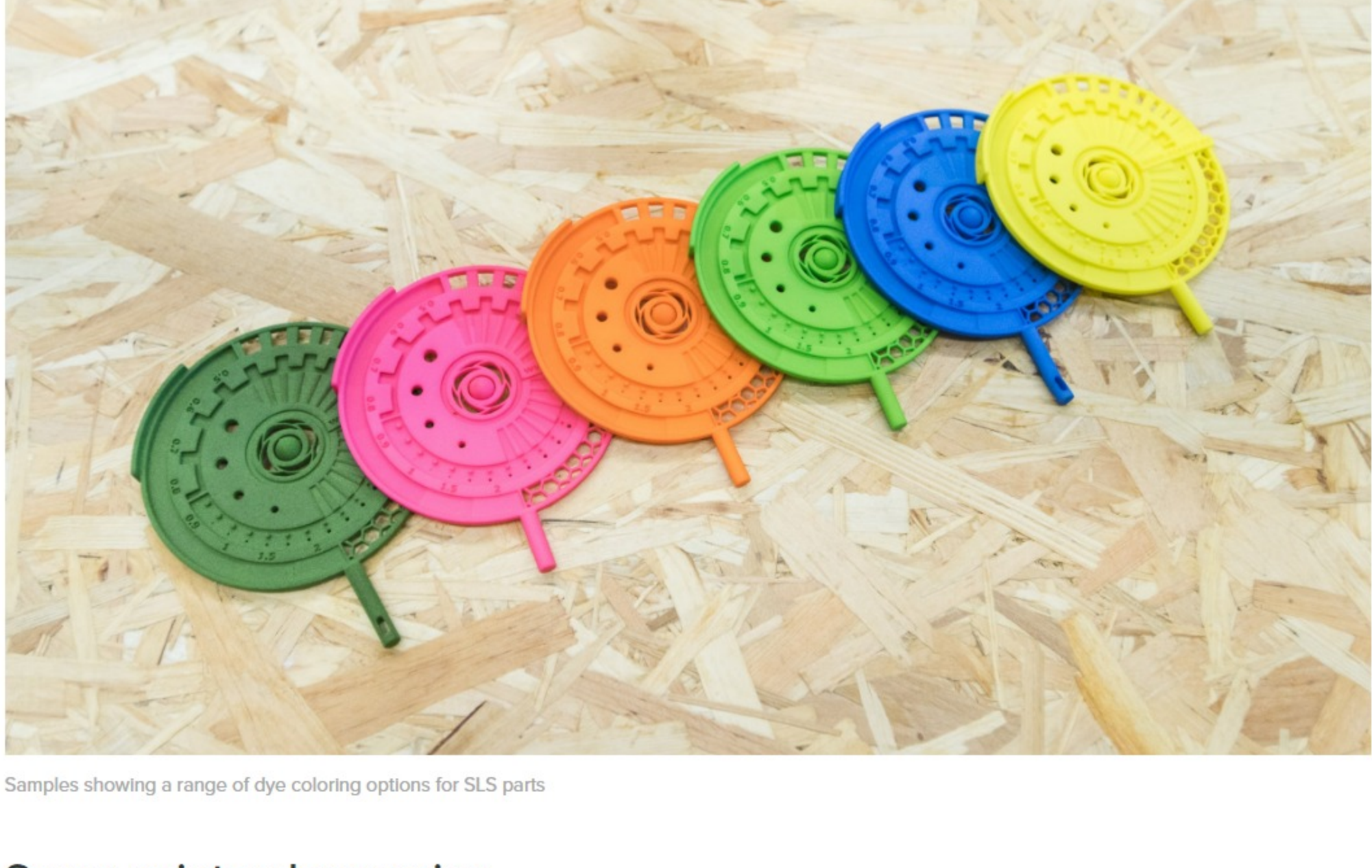
Pros

- + A large range of colours available
- + Does not affect part dimensions
- + Multiple parts can be dyed at once
- + Cost effective compared to other colouring methods
- + Good for complex geometries

Cons

- Dye penetration is only 0.5 mm deep
- Does not result in a glossy finish

Finish	★ ★ ★ ☆ ☆
Tolerances	★ ★ ★ ★ ★
Speed	★ ★ ★ ☆ ☆



Samples showing a range of dye coloring options for SLS parts

Spray paint or lacquering

For colouring of SLS parts dyeing is the best method. SLS parts are able to be spray painted. SLS parts can also be coated with a lacquer (varnish or clear coat). Via lacquering it is possible to obtain various finishes, such as high gloss or a metallic sheen. Lacquer coatings can improve wear resistance, surface hardness, watertightness and limit marks and smudges on the surface of the part.

Due to the porous nature of SLS it is recommended that 4 - 5 very thin coats are applied to achieve a final finish rather than 1 thick coat. This result in a faster drying time and reduce the likelihood of the paint or lacquer running.

Pros

- + Lacquer can improve mechanical properties
- + Results in a glossy smooth coloured or clear surface
- + Improves UV protection

Cons

- Labour intensive if lots of parts are coated
- Impacts overall part dimensions
- Good surface preparation required (removal of all loose powder)

Finish	★ ★ ★ ★ ☆
Tolerances	★ ★ ★ ☆ ☆
Speed	★ ★ ★ ☆ ☆



A glossy spray paint finish on an SLS part

Watertightness

A correctly sintered SLS part will have some inherent water resistance. Coatings can be applied to further enhance this. Silicones and vinyl-acrylates have been shown to provide the best results. Polyurethane (PU) is not recommended for waterproofing SLS parts. If complete water resistance is required a dip coating method is recommended.

Pros

- + Further improves water resistance/watertightness of parts
- + Coating can improve mechanical strength

Cons

- Coatings are generally thick affecting overall part accuracy

Finish	★ ★ ★ ☆ ☆
Tolerances	★ ★ ★ ☆ ☆
Speed	★ ★ ☆ ☆ ☆

Metal coating

SLS parts are able to be electroplating. Stainless steel, copper, nickel (or a combination of both) gold and chrome can be deposited on the surface of parts to increase strength or electrical conductivity in shielding applications. Parts are cleaned and a conductive layer of material is applied to the surface. The parts then go through traditional metal coating procedures. The plastic can be retained as structural support or removed to create thin-walled parts 25 to 125 microns thick.

Pros

- + Improves part strength and functionality
- + Aesthetically parts look like they are made of metal
- + Allows for part conductivity
- + Excellent surface finish

Cons

- Increases lead time
- Greatly increases cost
- Requires high level of skill (parts are often sent away to be coated)
- Limited number of metals available

Finish	★ ★ ★ ★ ★
Tolerances	★ ★ ☆ ☆ ☆
Speed	★ ☆ ☆ ☆ ☆

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